IX. Transportation Systems Management and Operations

Transportation Systems Management and Operations is a useful tool for analyzing regional transportation as an interconnected set of services and systems to effectively improve system performance and improved mobility though better management and use of the transportation network.

Some elements of M&O that are currently being deployed by member agencies within the MPO include:

- Intelligent Transportation Systems (ITS)
    - Traffic Management Centers, local and joint use
    - Coordinated Signal Deployments for transit and general purpose auto
    - Arterial Management Systems
    - Incident Detection and Response
    - Traveler Information Dissemination
- Courtesy patrols
- Incident Management
- Special Event Traffic Management
- Roadway Access Control
- Managed Lanes/HOV

Successful implementation of M&O strategies requires close coordination among the member agencies having ownership responsibilities on the transportation system. The MPO has a role in supporting the development and deployment of these systems by providing the forum for interagency project planning and development, as well as through prioritized project programming through the coordinating efforts of the TIP and MTP.

Intelligent Transportation Systems (ITS)

The 2030 MTP continues to explore new and innovative strategies to increase the efficiency of the transportation system. Included in those strategies is the promotion and deployment of Intelligent Transportation Systems (ITS). A major purpose of ITS is to enhance and coordinate the collection and dissemination of roadway and traveler information such as congestion levels, travel times, incident reporting, weather, etc, among agencies and private entities and to promote the sharing and dissemination of this information to the traveling public. This increased knowledge of roadway conditions for the users of the system has proven to reduce travel delays, increase safety on the roadway, and to promote the use of multi-modes of travel. In order to promote ITS development within the AMPA, the ITS Subcommittee has been established within the MPO committee structure with representation from MRCOG member agencies. Examples of ITS deployments include:

- Freeway and arterial management systems that employ coordinated signals, real time video monitoring of roadway conditions and incidents, and other roadway conditions
- Driver information systems that provide real time traveler information on congestion, crashes, and other roadway conditions made available through roadside dynamic message signs, internet, and the media
- Joint use traffic operations centers that allow agencies to monitor roadway conditions and interagency communication and coordination

- Signal preemption and automatic vehicle location to facilitate swifter transit operations and transit schedule and arrival information
- Improved incident detection and response for emergency and safety crews

Every agency within the AMPA that owns or maintains significant elements of the roadway and transportation infrastructure is developing and/or deploying ITS. At the time of the previous MTP document, the AMPA had yet to develop a plan for ITS deployment. Since then, however, the region's *ITS Deployment and Implementation Plan* has been completed by the Mid-Region Council of Governments and approved by the MTB in June, 2004 (R-04-18). This plan presents corridor-specific and systemwide analysis of ITS strategies for the AMPA. It is intended to provide "CIP"-type guidance for ITS programming in the TIP and MTP, as well as provide input for local agency ITS projects. Analysis included in the plan demonstrates that the implementation of ITS in the Albuquerque area now could provide approximately $100 million in benefits to travelers over the next five years. This plan includes a system map and benefits costs report by project/corridor with a detailed assessment of the ITS components and costs of each ITS subset. Further, it positions the Albuquerque area to move ahead with implementation of an ITS system that will enhance public safety, reduce congestion, improve access to travel and transit information, improve cost savings to motor carriers, transit operators, and government agencies, and reduce fuel consumption and emissions. In addition to traffic management, ITS has additional applications such as WIPP transport notifications, Homeland Security, general information about regional programs, Amber alerts, and so forth.

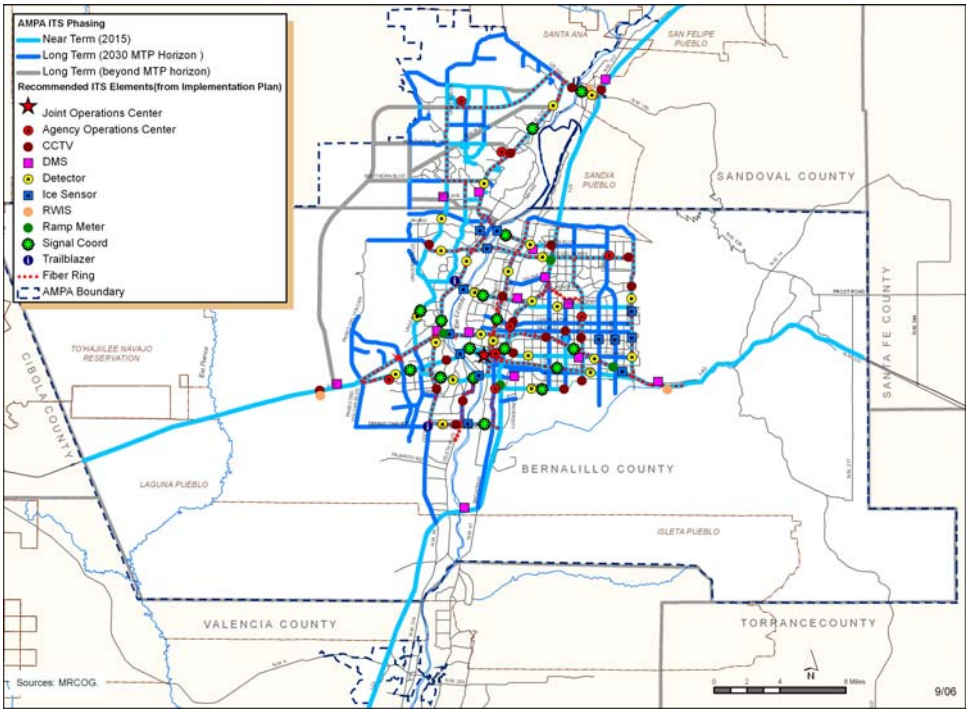
Key ITS elements/projects were identified in the plan as having significant benefit and have been given priority in agency project development and project programming. These include:

- Joint Operation Center for Coordinated ITS Deployment and Data Sharing
- Incident Management
- Traffic Signal Synchronization
- Traveler Information
- ITS Project "Mainstreaming" of ITS into other Construction Projects
- Region-wide Deployment of ITS to Maximize Benefits
- High Priority Projects for Maximum Benefits
    - Freeway Management, Ramp Metering
    - Key Arterials and Commuting Corridors, ie, Coors Blvd, Alameda, PdN

The primary emphasis of the Plan is to provide an integrated ITS system with the backbone of ITS on the Federal Interstate system, with complementary implementation on the major arterial system. Each member agency with traffic operations responsibilities within the AMPA participated in the development of the Plan. Additional federal monies are being requested to supplement current programming levels.

An updated map of the *AMPA ITS Implementation Plan* is included as **Map IX-1** below.

In an effort to meet the requirement included in 23 CFR Part 940, ITS Architecture and Standards, the *AMPA ITS Regional Architecture* was completed and approved by the FHWA and FTA during the development of this document. The architecture will ensure the coordinated and integrated deployment of ITS within the AMPA will follow to ensure maximum benefit to the users of the system.



Map IX-1. ITS Implementation Plan for the AMPA.

ITS Project programming included in the new TIP is over $35 million. Total funding for ITS over the life of the plan is over $116 million. It is important to note that this amount of project-specific ITS funding does not include ongoing signal and related equipment upgrades undertaken as part of the agency's normal signal operations and maintenance, as well as the incremental "mainstreaming" of ITS elements performed on applicable non-ITS roadway projects in support of the Plan. Though very difficult to monitor, these additional ITS related items, such as the installation of fiber-optic conduit and other telemetry included in all applicable roadway and infrastructure construction activities result in a higher amount of ITS programming. Current ITS and related activities ongoing and/or programmed in the TIP include the following:

- NMDOT District 3 Courtesy Patrol including 6 vehicles operating on urban interstates and freeway-type DOT facilities.
- NMDOT and District 3 Freeway Management System including Traffic Management and Traffic Operations Center, ITS elements including CCTV, DMS, RTMS Fiber Telemetry, . This facility includes the state of the art in ITS traffic monitoring and detection equipment and communications. Co-location for other infrastructure owning entities, Emergency Service Providers, Media, and maintenance personnel within the AMPA.
- NMDOT US 550 Signal Interconnect (and Smart Corridor)
- City of Albuquerque Fiber Ring, Interconnect Telemetry and Signal Upgrades, TOC upgrades
- City Of Rio Rancho Fiber Ring, TOC Upgrades, and Signal Upgrades
- Bernalillo County Fiber, CCTV, TOC Upgrades, and Signal Upgrades
- Approximately 984 centerline miles of ITS deployment identified in the ITS Implementation Plan.

To assist in establishing ITS project deployment priorities for programming within the TIP and MTP, the Plan includes thorough cost benefits analysis using the Intelligent Transportation Systems Deployment Analysis Software package (IDAS). The set of recommended ITS projects from the ITS Implementation Plan is shown in **Tables IX-1 and IX-2.** As mentioned above, numerous ITS elements are being deployed through ITS Mainstreaming as part of larger non-ITS projects*. ITS specific Projects currently programmed for inclusion in the 2030 MTP are included in **Table IX-3.**

Table IX-1. ITS Implementation Plan, Stage I Deployment

ITS Option Packaging in IDAS	Corridor(s)		ITS Elements Included in Option Package
ITS Option 1	**Coors/ Alameda/ NM 528**	**Stage 1**	Coors-7 CCTV Cameras 14.5 Miles Fiber Optic Cable 1 Pavement Sensor 6 Remote Traffic Monitoring Stations 15 Trailblazer Signs (Arterial-based changeable message signs) Alameda/528-1 CCTV Camera 1 Pavement Sensor 4 Remote Traffic Monitoring Stations 15 Traffic Signal Controller Upgrades Traffic Signal Coordination
ITS Option 2	**2nd Street**	**Stage 1**	4 CCTV Cameras 8 Miles Fiber Optic Cable 6 Remote Traffic Monitoring Stations 17 Traffic Signal Controller Upgrades Traffic Signal Coordination
ITS Option 3	**Gibson/Central/ Louisiana/Lomas**	**Stage 1**	Gibson-4 CCTV Cameras; Central-2 CCTV Cameras 1 Pavement Sensor; Louisiana-1 CCTV Camera; Lomas-2 CCTV Cameras
ITS Option 4	**Montano**	**Stage 1**	1 CCTV Camera 1 Pavement Sensor 5 Remote Traffic Monitoring Stations
ITS Option 5	**Paseo del Norte**	**Stage 1**	Paseo Del Norte 9.5 Miles Fiber Optic Cable 1 Pavement Sensor 3 Remote Traffic Monitoring Stations
ITS Option 6	**Bridge/Rio Bravo**	**Stage 1**	Bridge 1 Pavement Sensor Rio Bravo 1 Pavement Sensor
ITS Option 7	**US 550**	**Stage 1**	1 CCTV Camera 1 Road Weather Information System
ITS Option 8	**Tramway**	**Stage 1**	1 CCTV Camera 7.5 Miles Fiber Optic Cable 1 Road Weather Information Systems 5 Pavement Sensor 16 Traffic Signal Controllers Upgrade
ITS Option 9	**Urban Interstates**	**Stage 1**	CCTV Cameras Dynamic Message Signs 75 Remote Traffic Monitoring Stations 2 Pavement Sensors 33 Traffic Signal Controllers/Cabinets Upgrade (Frontage Roads) Traffic Signal Coordination (Frontage Roads)

ITS Option 10	**Extended Area Interstates**	**Stage 1**	2 CCTV Cameras 2 Road Weather Information Systems 1 Remote Traffic Monitoring Stations

Table IX-2. ITS Implementation Plan, Stage 2 Deployment

ITS Option Packaging in IDAS	Corridor(s)		ITS Elements Included in Option Package
ITS Option 1	**Coors**	**Stage 2**	27 Traffic Signal Controller Upgrades Traffic Signal Coordination 3 Arterial DMS 3 Trailblazer Signs
ITS Option 2	**Alameda/ NM 528**	**Stage 2**	3 CCTV Cameras 2 Remote Traffic Monitoring Stations 15 Traffic Signal Controller Upgrades Traffic Signal Coordination 1 Arterial DMS
ITS Option 3	**Gibson**	**Stage 2**	3 Remote Traffic Monitoring Stations 10 Traffic Signal Controller Upgrades Traffic Signal Coordination 2 Arterial DMS
ITS Option 6	**Montano/Paseo del Norte**	**Stage 2**	Montano-2 Arterial DMS Paseo Del Norte-1 Arterial DMS
ITS Option 7	**Bridge**	**Stage 2**	2 Remote Traffic Monitoring Stations 10 Traffic Signal Controller Upgrades Traffic Signal Coordination
ITS Option 4	**Central**	**Stage 2**	5 CCTV 10 Remote Traffic Monitoring Stations 50 Traffic Signal Controller Upgrades Traffic Signal Coordination
ITS Option 5	**Lomas**	**Stage 2**	2 CCTV Cameras 7 Remote Traffic Monitoring Stations 26 Traffic Signal Controller Upgrades Traffic Signal Coordination 1 Arterial DMS
ITS Option 8	**Rio Bravo**	**Stage 2**	1 CCTV Camera 4 Remote Traffic Monitoring Stations 6 Traffic Signal Controller Upgrades Traffic Signal Coordination 2.7 miles of fiber optic cable and conduit to Complete fiber from Coors Boulevard to I-25 (2 segments
ITS Option 9	**Louisiana**	**Stage 2**	1 Remote Traffic Monitoring Stations Wyoming 1 CCTV Camera
ITS Option 10	**Unser**	**Stage 2**	5 CCTV Cameras Traffic Signal Coordination 5 Remote Traffic Monitoring Stations 9 TS Controllers Upgrade 1 Arterial DMS

ITS Option 11	**US 550**	**Stage 2**	1 Remote Traffic Monitoring Stations
ITS Option 12	**Tramway**	**Stage 2**	6 Remote Traffic Monitoring Stations
ITS Option 13	**Urban Interstates**	**Stage 2**	54 Ramp Meters
ITS Option 14	**Extended Area Interstates**	**Stage 2**	1 CCTV Camera 7 Freeway DMS

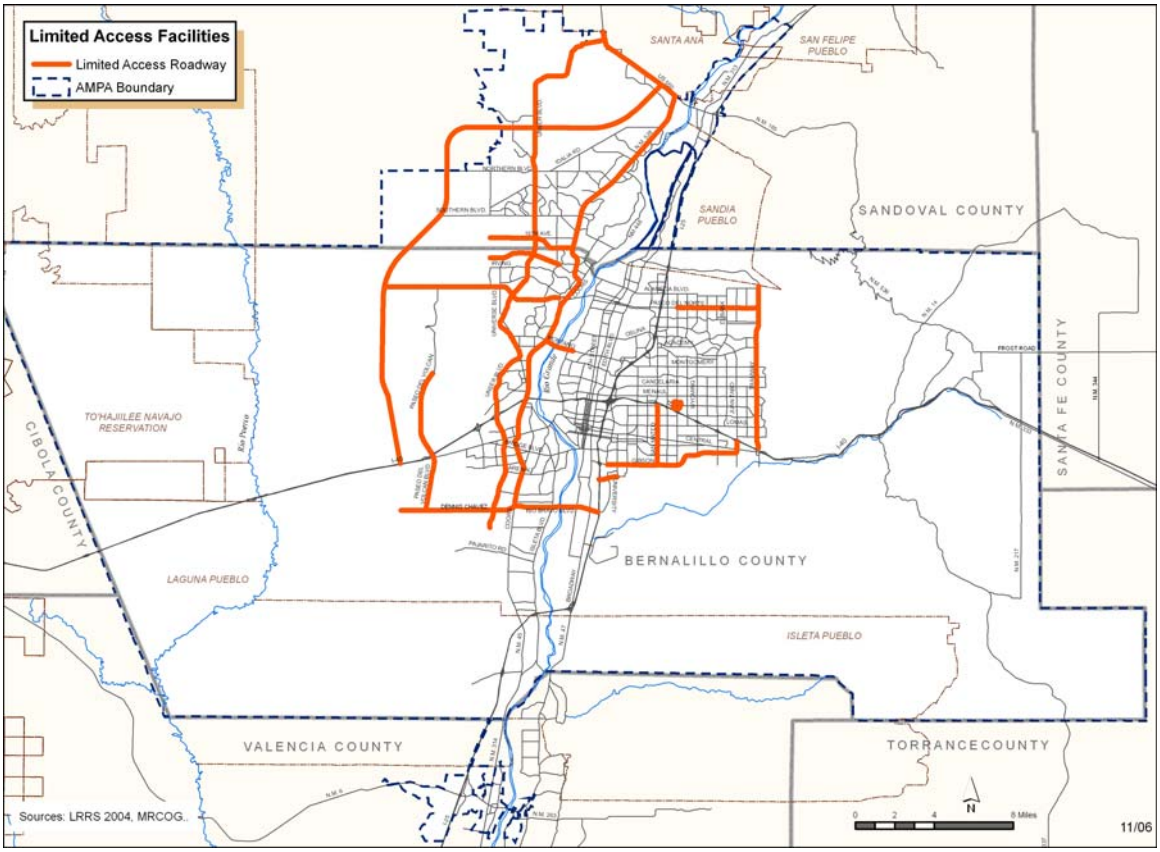
PIN	Project Title	Project Description	Termini	Lead Agency
563.0	TSM - Incident Management System	**Implement system to manage highway incidents**	**AMPA Wide**	**NMDOT**
568.0	TSM - Motorist Assistance Courtesy Patrols	**Expand courtesy patrols (H.E.L.P. vehicles)**	**AMPA Wide**	**NMDOT**
40.0	ITS - Albuquerque Traffic Management System	**Replace traffic signal controllers, communications, camera monitoring, other ITS**	**City of Albuquerque**	**City of Albuquerque**
384.0	Transportation Surveillance Program	**Traffic Data Collection for NM Traf. Mon. Sys., HPMS-Hwy. Perf. Mon. Sys., GIS, Traf. Flow data & model devel.**	**AMPA Wide**	**MRCOG**
48.0	ITS - District 3 ITS Deployment	**Implement ITS Improvements as per ITS Implementation Plan**	**AMPA Wide**	**NMDOT**
Misc.	Project Level ITS Deployment	**Deploy ITS components on project level as per ITS Implementation Plan**	**City of Rio Rancho**	**City of Rio Rancho**

Table IX-3. ITS-Specific Projects Submitted for Inclusion in the MTP

Access Management

Roadways access management is another method of System Management and Operations that can benefit the throughput and function of the overall transportation system. Member agencies within the MRCOG MPO have agreed that certain facilities be designated as “limited access roadways” with prescribed access limitations intended to increase roadway throughput primarily for auto traffic **(Map IX-2)**. Recommendations within this policy are to be supported by local and state agency street standards and policies.

In order for any limited access designation to be effective, it is critical that local land use and access decisions be coordinated within the context of the limited access roadway. Therefore, it is intended that each member agency represented on the MRCOG's MTB with jurisdiction over these roadways and/or adjacent land should coordinate access to lands along that facility consistent with these policies. For example, roadways designated as limited access limit the number and frequency of driveways such that access to the adjacent lands must be coordinated in a planned manner such that access can be facilitated with adjacent roadways, frontage road systems, etc. Corridor studies, and/or other planning efforts are the typical mechanism to identify and plan for these corridors. The MRCOG has established the Roadway Access Policies as a guide to be used by local agencies within their planning and development review activities to promote coordination and ensure consistency with this policy.

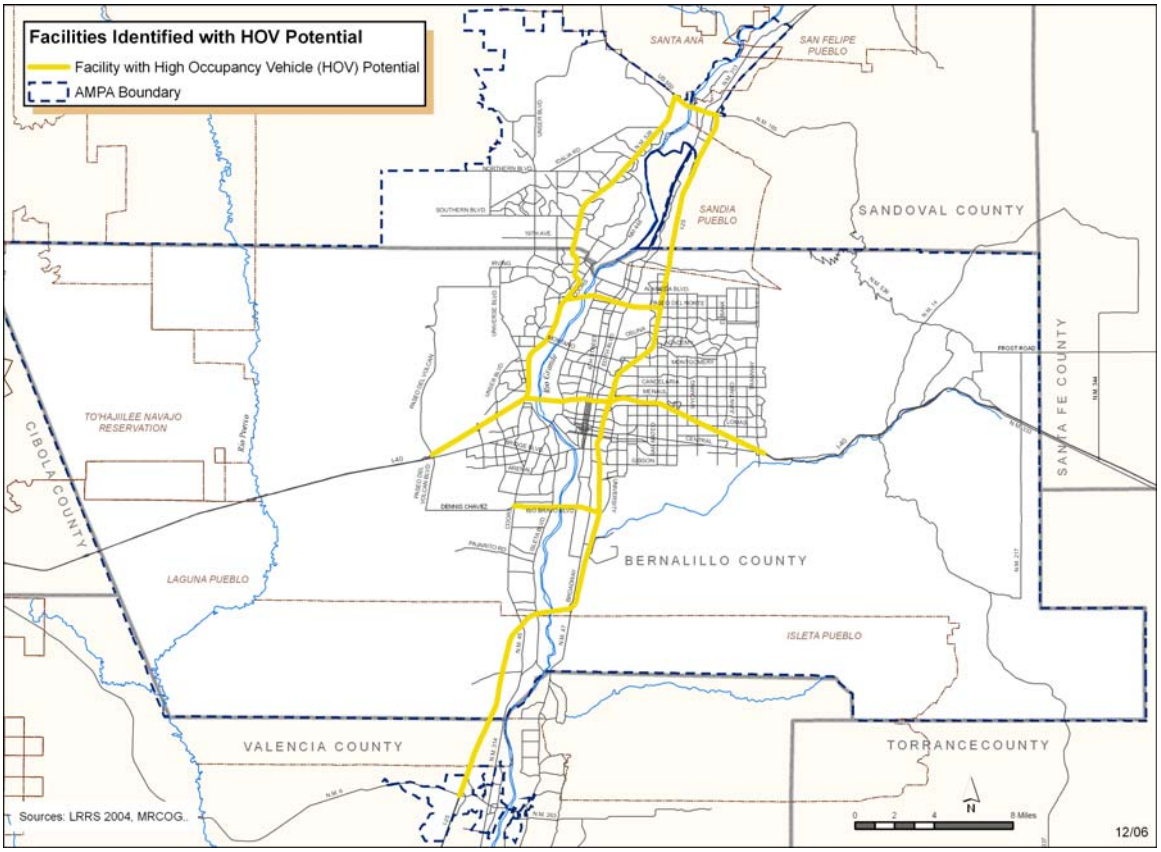


Map IX-2. Limited Access Arterials for the AMPA.

Managed Lanes/High Occupancy Vehicle (HOV)

Managed lanes and facilities dedicated to high occupancy vehicle or truck traffic only can be effective in mitigating congestion, increasing traffic safety, and encouraging increased carpooling and transit use. The Middle Rio Grande Connections study conducted by the NMDOT and MRCOG in coordination with member agencies and the FHWA reviewed the performance of the entire roadway transportation system for the AMPA. One of the key recommendations of this study was the identification of facilities with high potential for HOV implementation **(see Map IX-3)**. The managed lanes/HOV element of the AMPA roadway system will work hand in hand with the ITS

Implementation Plan, with ITS deployments providing full support for their implementation. The City of Albuquerque has identified as part of its near term ITS deployment strategy near-term implementation of ITS elements on river crossings within its jurisdictional boundaries. Other river crossings are being deployed with ITS consistent with the ITS Implementation Plan such as the NMDOT's fiber interconnect across the US 550 at the northern boundary of the AMPA. A Managed Lanes/HOV study is identified in the TIP and MTP that will further refine the concept and identify specific project scope(s), agency responsibilities, and timing for prioritized programming and implementation.



Map IX-3. High Occupancy Vehicle (HOV) proposed network for the AMPA.

Again, the MPO has a role in supporting the development and deployment of these systems by providing a forum for interagency project planning and development, as well as through prioritized project programming through the coordinating efforts of the TIP and MTP.

Paseo Del Norte Managed Lane/HOV Preliminary Analysis

As part of the development of this MTP document, the Policy Board has expressed interest in the possibility of implementing managed lanes and/or HOV across at least one of our major river crossings within the AMPA (UPWP 5.5f). MRCOG staff in coordination with member agencies within the AMPA have initiated a River Crossings Corridor Study which will explore, as a formal corridor study, the feasibility of deploying HOV/Managed Lanes on a major river crossing within the AMPA. In anticipation of this effort, MRCOG staff has performed preliminary analysis to assess initial feasibility of

such a strategy. The analysis focused on the 2030 PM commute within the Paseo del Norte corridor between I 25 and Coors Blvd. This facility was chosen primarily because it is a limited access/urban freeway type facility serving a major commute within the AMPA. Three scenarios were evaluated as HOV/Carpool/Transit (Rapid Ride) per a reversible managed lane of different configurations and were then compared to the base (no improvements).

Alternatives evaluated as follows:

- Base conditions, no improvements
- Alternative 2 – Reversible General Purpose Lane
- Alternative 3 – Reversible Lane/Managed
- Alternative 4 – Managed Lanes Convert From Existing

The analysis utilized the MRCOG Travel Demand Model and the TRAM Accessibility Model to identify key travel times and travel markets for each alternative. The roadway network was coded to represent the changes in general purpose lanes resulting from the addition/conversion of general purpose lanes to reversible and/or managed lanes. Congested roadway speeds were then used in the TRAM model to identify the resulting travel time contours between a representative origin/destination pair within the commuter travel shed. The speed assumed for the managed lane for both the auto "diamond" and transit-only was coded as 45 mile per hour.

The two representative origin/destination points identified were:

- Uptown Employment Center with Rapid Ride Station, and,
- Park and Ride lot at the vicinity of Paseo del Norte and Unser Blvd

The Rapid Ride was coded with 6 stations along the route including the Rail Runner Commuter Rail Station at El Pueblo and 2nd St. Separate analysis was performed for auto travel with general purpose lanes and Managed/HOV, and Managed lanes with Rapid Ride transit on Paseo del Norte (see graphic). Preliminary results show that there are positive travel time benefits possible with each of the evaluation scenarios in varying degree. With a managed, or "Diamond" lane, restrictions are placed on its use such as for vehicle occupancy (carpool), and/or vehicle type (transit). This designation can be varied by time of day, ie, *"Peak Period HOV Lanes*". As capacity is most limited and delay most severe at intersections with other roadways, it would be recommended that in addition to implementing an HOV lane along the corridor, exclusive lanes and/or priority be given at intersections entering the corridor. This way, the benefits in travel time and priority would be offered for a larger portion of the total trip. Plus, HOV incentives will result in fewer cars on the system, thus reducing the demand on roadway infrastructure. Preliminary results of the analysis are presented in **Table IX-4** below.

Maps IX-4 through **IX-10** depict the information included in Table III-8 in a graphical manner. The differences between the scenarios are most apparent for the targeted Southeast-to-Northwest travel corridor that Paseo del Norte serves; particularly, northwest Albuquerque and Rio Rancho. Alternative 2, *Reversible General Purpose Lane* shows a marginal benefit to auto travel times, although not as significant when compared to any of the "managed" scenarios. For example, the travel time savings over the Base for Alternative 2 is approximately 10%. By comparison, the travel time savings increase with Alternatives 3 and 4 *with "Managed Lanes"* is 16% and 54% respectively. What this shows is that by providing a "Managed/HOV"-type option within this corridor,

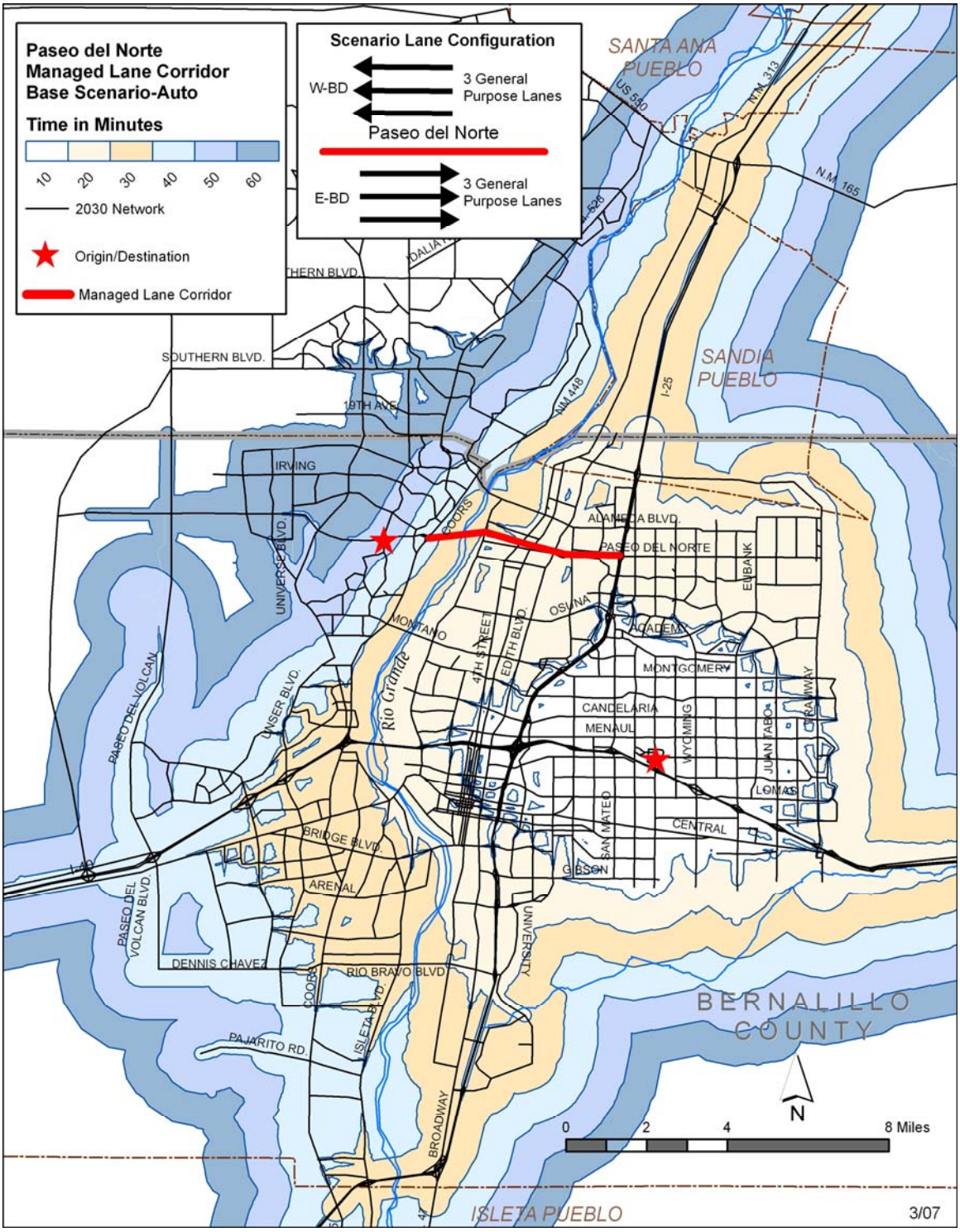
travel times can be reduced. It is interesting to note that in Alternative 2, *Reversible General Purpose Lane*, though an additional general purpose lane is added as a reversible lane, the actual travel time savings are marginal. This is due to the latent demand that exists within the corridor and on river crossings within the AMPA in general that tends to have an “overwhelming” effect on any additional general purpose capacity added.

The results clearly demonstrate that there are travel time benefits to implementing a reversible/managed lane across the Paseo del Norte River Crossing. This preliminary analysis is based on has taken a general assessment of the potential benefit of such a strategy from a demand and travel time perspective using the MRCOG modeling tools. It did not consider such conditions as the design and engineering consideration of the alternatives. However, given the limited possibilities for addressing river crossing travel demand, ie, environmental impacts, limited right of way, and limited agency support for any new crossings in this corridor, the potential benefits of this new approach strongly support further consideration.

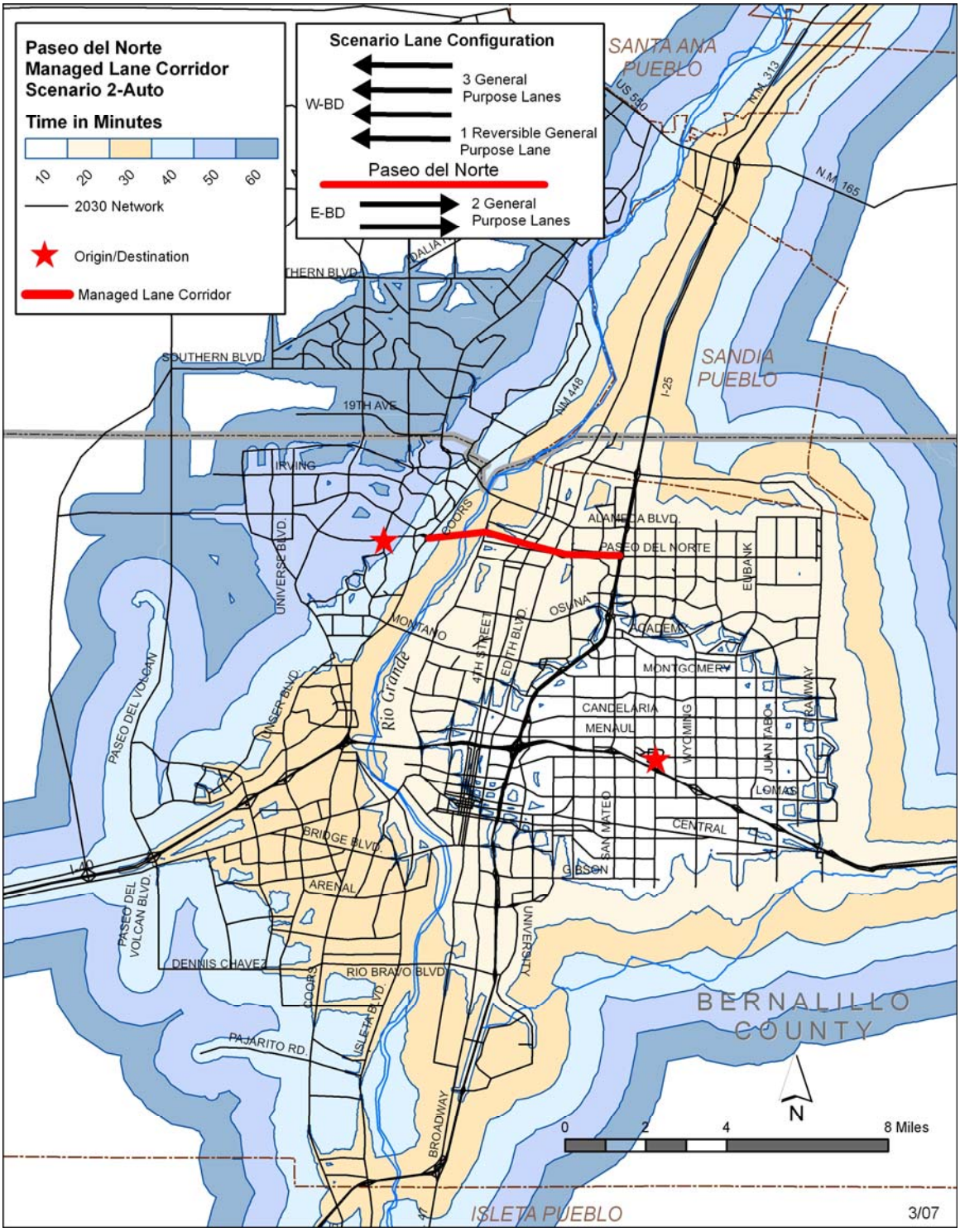
Scenario:	Description:	General Purpose Lanes Configuration*:	Managed Lanes Configuration**	Key Commute Auto Travel Times (minutes):	Key Commute Transit Travel Times (minutes):
Base Alternative 1 - No Changes to Existing Facility	Three general purpose lanes coded per direction	3 eb/3 wb	0	57'	Outside of 60' Contour
Alternative 2 - Reversible General Purpose Lane*	Four westbound and two eastbound lanes coded as general purpose (one westbound lane is reversible)	2 eb/4 wb	0	52'	Outside of 60' Contour
Alternative 3 - Reversible General Purpose Lane is Managed Lane*	Reversible lane is converted from general purpose to the managed lane. Opposite direction is coded as two lanes	2 eb/3 wb	1 wb	49'	Outside of 60' Contour
Alternative 4 - Managed Lanes, Existing General Purpose Lane Converted	Existing General Purpose lane is converted to managed lane	2 eb/2 wb	1 eb 1 wb	37'	51'

- Reversible lanes alternate for the AM/PM, eastbound and westbound, respectively. Pm Period lane configuration shown.
- ** Managed lane represents HOV

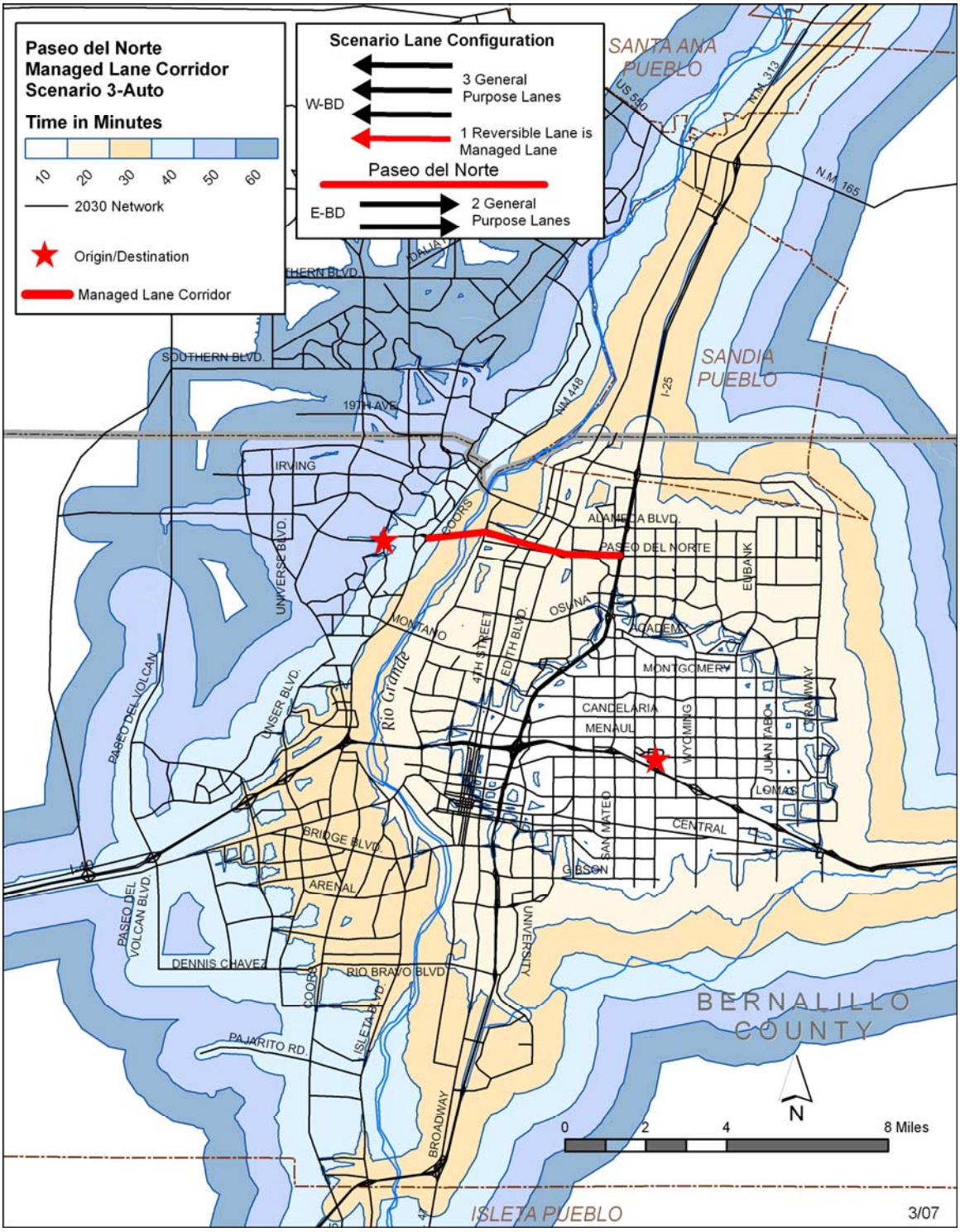
TABLE IX-4. Paseo del Norte HOV/Managed Lanes Preliminary Analysis Results for the Key Commute Identified in the Analysis.



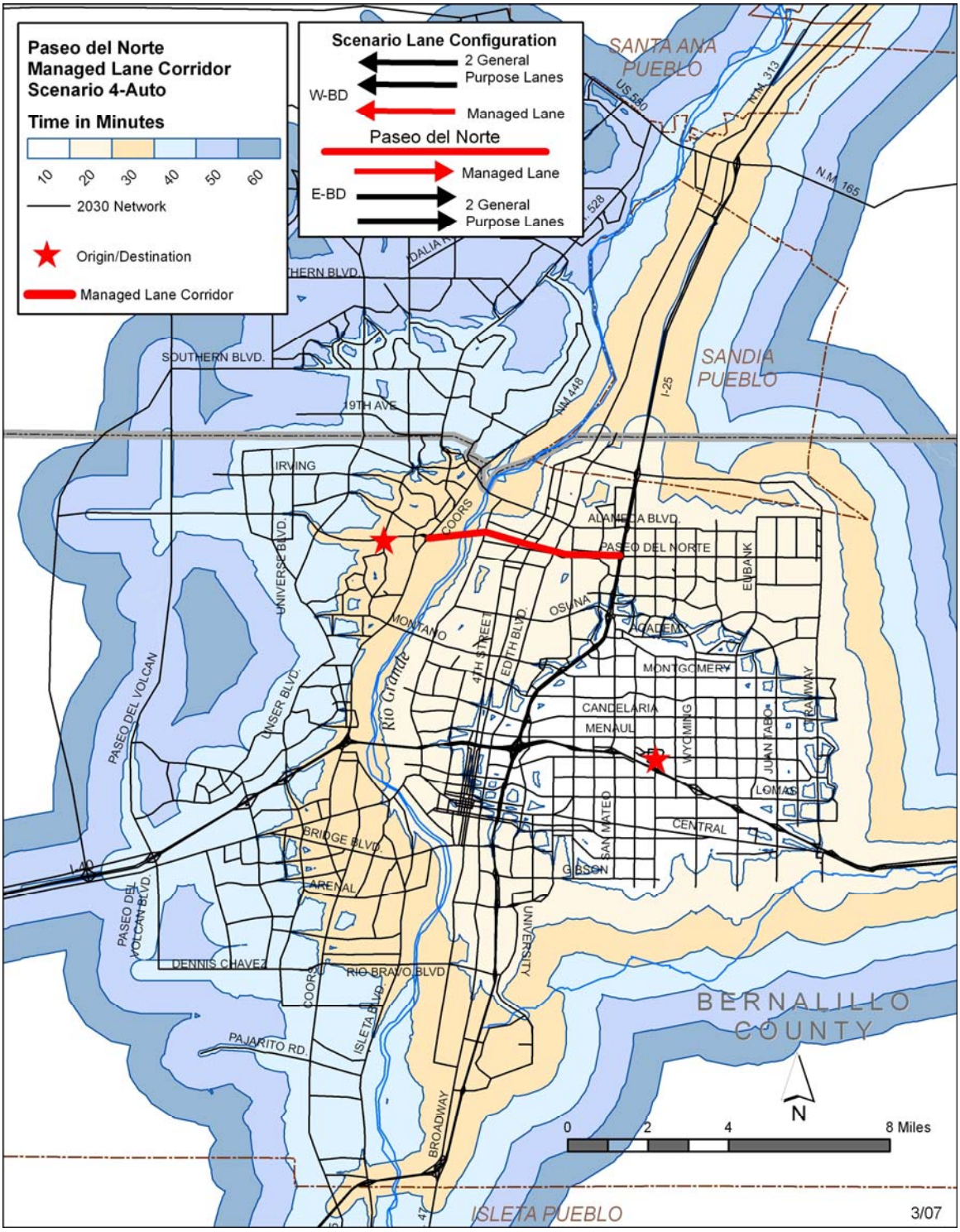
Map IX-4. Auto Travel Times for Base Scenario, General Purpose Lanes.



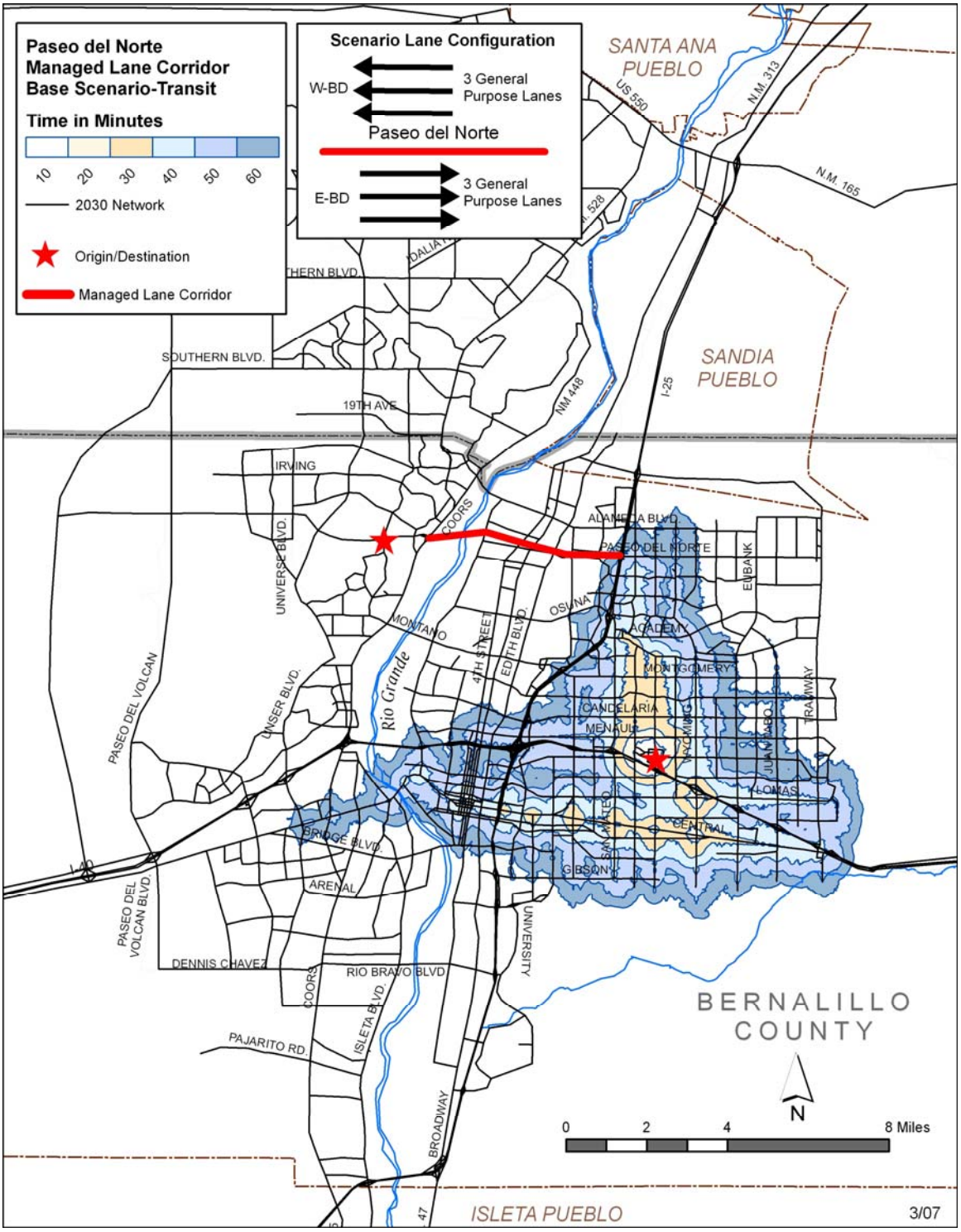
Map IX-5. Auto Travel Times for Scenario 2, Reversible General Purpose Lane.



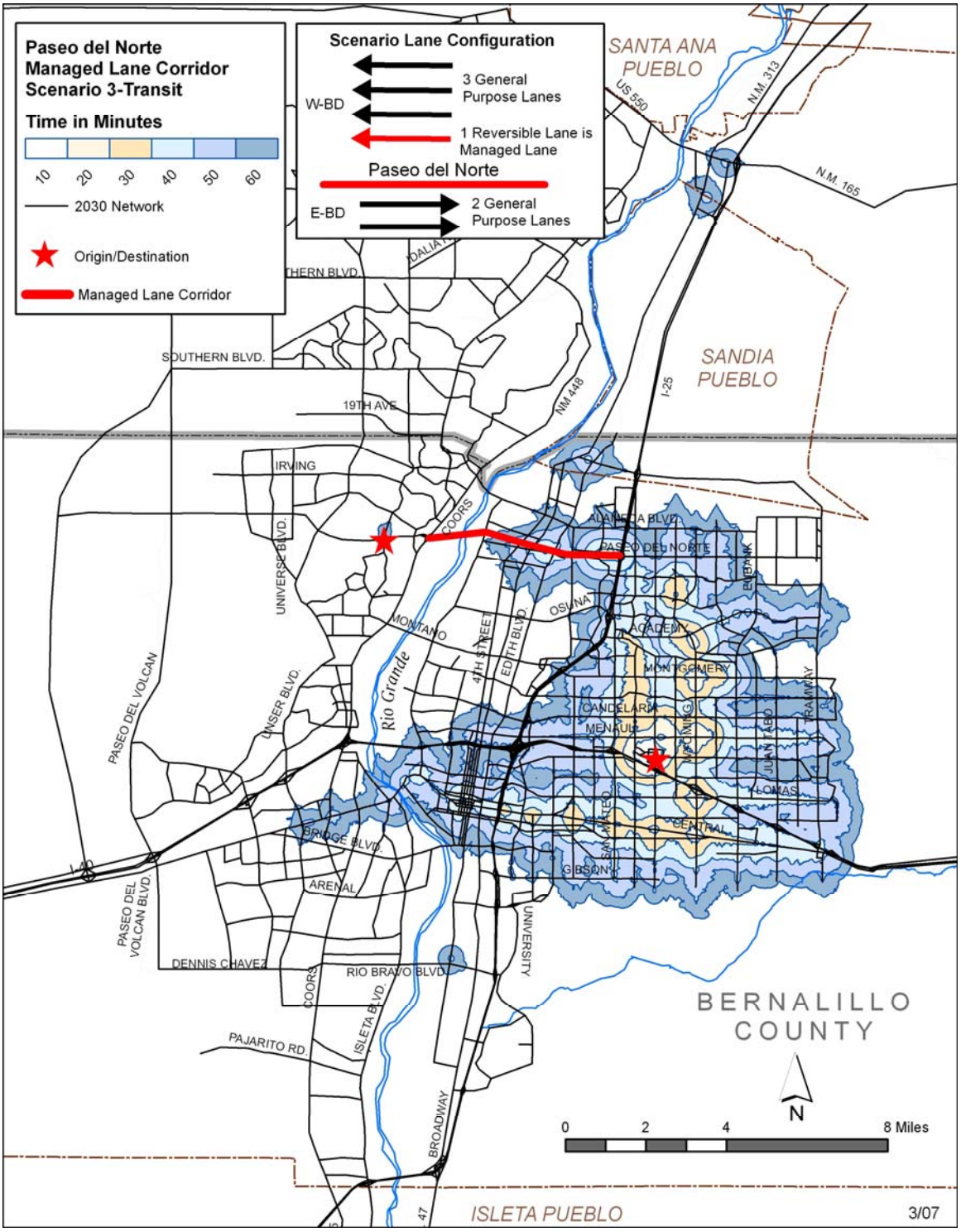
Map IX-6. Auto Travel Times for Scenario 3, Reversible Lane as the Managed Lane.



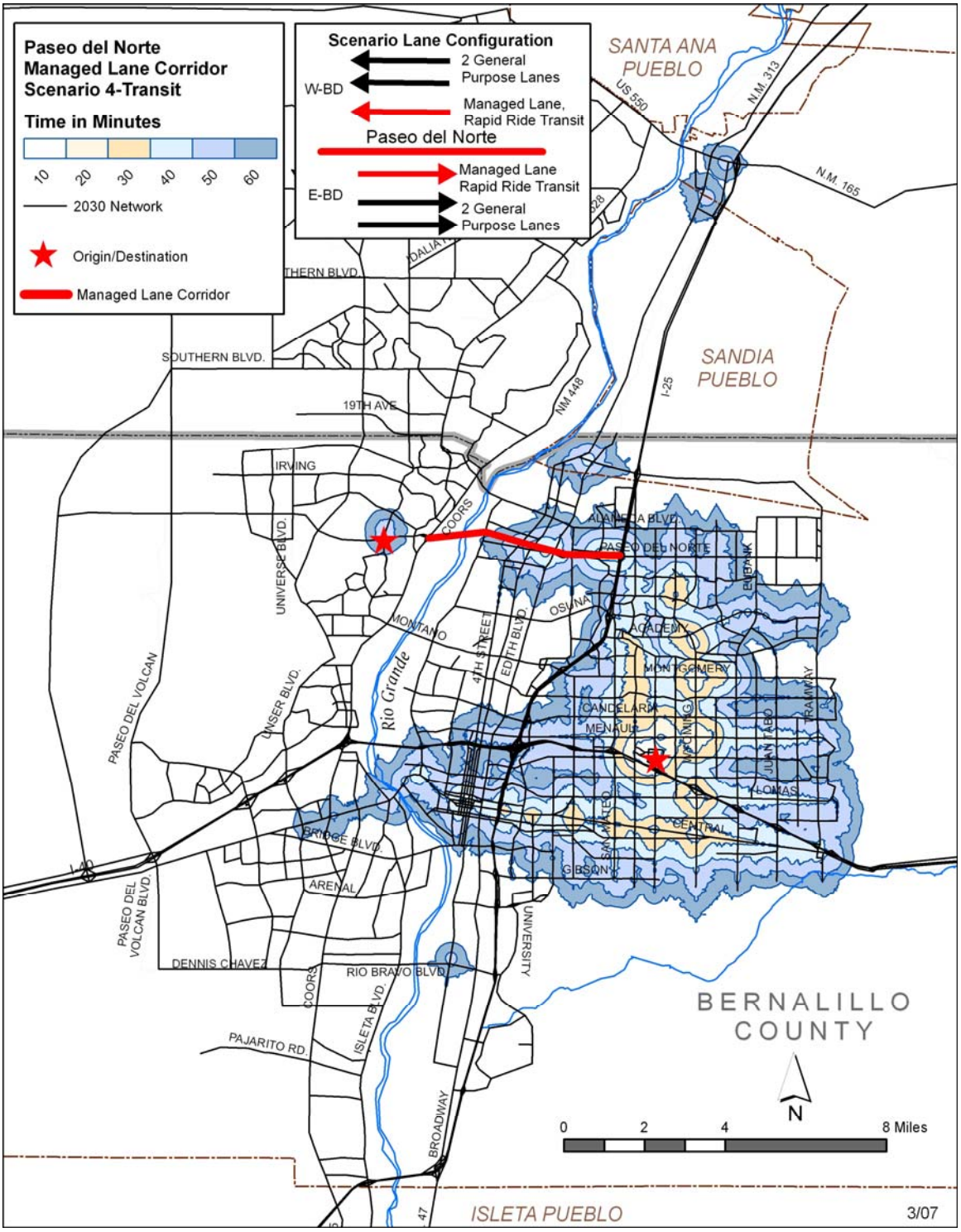
Map IX-7. Auto Travel Times for Scenario 4, Existing General Purpose Lane is the Managed Lane.



Map IX-8. Transit Travel Times for Base Scenario, Existing General Purpose Lanes and No Rapid Ride



Map IX-9. Transit Travel Times for Scenario 3, Reversible Lane is Managed Lane, Rapid Ride Transit



Map IX-10. Transit Travel Times for Scenario 4, Existing General Purpose Lane is Managed Lane, Rapid Ride Transit

Incident Management

Traffic congestion is a daily concern in many medium sized cities through the United States. National statistics have shown that as much as 60% of all traffic delays are related to traffic accidents; and that for every minute that an accident remains in a traffic

lane, traffic is delayed up to an additional 5 minutes. In response to these issues, a Freeway Courtesy Patrol (FCP) program was implemented in 1998. The original program was established to assist in the traffic management of the construction work zone for the reconstruction of the Big I project. This program has evolved into a resource that enhances motorist safety and security while reducing traffic congestion. In a continued effort to support incident management initiatives in the MRCOG MPO, data has been collected and analyzed for the operations of the Freeway Courtesy Patrol for 2005. The four major objectives for the FCP drivers are to assist stranded motorists; assisting local law enforcement agencies in traffic control around traffic crashes; detect, mark, and report unoccupied vehicles; and move or assist in moving debris off the roadways. Since its inception in 1998, FCP drivers have responded to thousands of calls for assistance ranging from saving lost dogs trapped on the freeway to full interstate closures.

Currently, the program has 5 vehicles patrolling from 6:00 a.m. to 7:00 p.m., Monday through Friday. The patrol also operates on special-event days and some holidays. The highest used service that is offered by our FCP is assisting stranded motorists. The typical types of calls that are responded to are:

- changing tires,
- providing gas and other fluids to motorists,
- providing minor mechanical assistance to motorists,
- offering motorists transportation to the nearest freeway exit

Current assessment of the effectiveness of this program shows that average reduction in delay from freeway incidents has been reduced by 17 to 30 minutes, depending on the type of lane closure.

The City of Albuquerque Police Department (APD) in coordination with the Mayor's office and the City of Albuquerque Department of Municipal Development (DMD) has developed a regional Incident Traffic Management Plan. Upon full deployment of the NMDOT's centralized Traffic Management Center, it is anticipated that further integration of the AMPA's incident management procedures for all ITS Stakeholders will be realized.

Special Event Traffic Management

In addition to Incident Management activities, the importance of coordinated Special Event Traffic Management is recognized within the AMPA as being critical to ensuring that many of the special event activities held annually within the AMPA go as smoothly and safely as possible. Specific special event traffic management plans for such events as the International Balloon Fiesta, the New Mexico State Fair, large sporting events and concerts, etc. are being used to promote improved delivery of visitors and patrons to these events. Shuttle busses, reversible lanes, and parking management strategies are among those used for this purpose. Upon full deployment of the NMDOT's centralized Traffic Management Center, it is anticipated that further integration of the AMPA's incident management procedures for all ITS Stakeholders will be realized.